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AUTHOR Stratton, Leslie S.; O'Toole, Dennis M.; Wetzel, James N.
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This study uses data from the 1989-1994 Beginning Postsecondary Survey to ascertain the prevalence of such nontraditional enrollment practices as part-time and stop-out behavior. The decision to enroll initially as a part-time or full-time student was examined, contingent on the initial decision to attend college. A theoretical model that explicitly recognizes the role of employment opportunities in determining full-time/part-time enrollment options is developed. Empirical results from a logit model of the initial enrollment decision are consistent with this theoretical model and indicate that economic factors such as expected earnings and the unemployment rate significantly influence the decision to enroll on a part-time versus a full-time basis. (Contains 5 tables and 39 references.) (Author/SLD)

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Factors Affecting Part-Time College Enrollment Within the First Year*

By

Leslie S. Stratton

Associate Professor

Dennis M. O'Toole

Associate Professor

James N. Wetzel

Professor

Department of Economics

Virginia Commonwealth University

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Factors Affecting Part-Time College Enrollment

Within the First Year

ABSTRACT

This study uses data from the 1989-94 Beginning Post-Secondary Survey to ascertain the prevalence of such non-traditional enrollment practices as part-time and stop-out behavior. The decision to enroll initially as a part-time or full-time student is then examined, contingent on the initial decision to attend college. A theoretical model that explicitly recognizes the role of employment opportunities in determining full-time/part-time enrollment outcomes is developed. Empirical results from a logit model of the initial enrollment decision are consistent with this theoretical model and indicate that economic factors such as expected earnings and the unemployment rate significantly influence the decision to enroll on a part-time versus a full-time basis.

Introduction

The stereotypical college student is an 18-year-old who leaves home and enrolls full-time for four consecutive years at a picturesque residential campus. Most research on post-secondary educational choice and enrollment has concentrated on this traditional segment of the market. However, older students (age 25 and over) comprised nearly 25 percent of undergraduates enrolled in four-year institutions in 1999. Over sixty percent of these older students were enrolled part-time. These nontraditional students (as measured both by age and part-time status) have been largely excluded from most research studies. As a result, relatively little is known about the dynamics underlying this type of nontraditional college experience.

Our goal is to use a national sample of undergraduates to examine the full range of enrollment patterns. Our sample is drawn from the Beginning Post-Secondary (BPS) survey conducted by the National Center for Education Statistics (NCES) and consists of students pursuing an academic degree who were first enrolled during the 1989-90 academic year. We begin by documenting the diversity within the sample, both as regards student characteristics and as regards enrollment patterns. We proceed by modeling first term enrollment status (part-time versus full-time) conditional upon having decided to enroll. Explanatory variables include personal characteristics such as age, gender, race, and ability; background characteristics such as parental education; household characteristics such as marital status and children's ages; and economic factors such as the local unemployment rate and potential earnings. Economic factors in particular have received relatively little attention in the literature, but are found to be a significant determinant of part-time enrollment. We close by presenting preliminary results from a persistence model in which second term enrollment status is examined. The evidence strongly suggests that second term outcomes depend upon first term status.

Literature Review

There is a substantial literature on the decision making process involved in college enrollment. Hearn and Longaneker (1985), Leslie and Brinkman (1987), Becker (1990), and McPherson and Schapiro

(1991) provide reviews of the early empirical work in this area. Many of these studies use data aggregated across states or across colleges. Personal characteristics such as race and gender are available only as a fraction of enrollment. The primary purpose of many of these studies was to examine the impact of tuition and financial aid on the decision to enroll.

Studies using individual, student specific data generally fall into one of two categories. First, there have been a number of institution-specific studies of the decision to enroll. Ehrenberg and Sherman (1984) examine enrollment at Cornell. Seneca and Taussig (1987) examine enrollment at Rutgers. Moore, Studenmund, and Slobko (1991) examine enrollment at Occidental College in Los Angeles. Dickey, Asher, and Tweddale (1989) examine statewide enrollment for the public university system in Michigan. In a series of studies, Hoenack and Weiler (1975, 1979) and Hoenack and Pierro (1990) examine data from the University of Minnesota. The Minnesota studies in particular are valuable because of the detailed data available. Many of these studies focus on first year enrollment at a residential campus. However, it is not clear how well their conclusions generalize to commuter-oriented schools or to the national level.

A different line of research focuses on the ability of institutions to retain students once they begin their studies. Tinto (1975, 1982, 1987, 1988, 1989) formulated a popular model of retention in which the likelihood of retaining an individual student is a function of the match between that student's own academic ability and personal motivation and the school's academic and social characteristics. Tinto refers to the academic matching of the student and the institution as the academic integration factor. How well the student blends into the social aspect of the school is referred to as the social integration factor. Bean (1980) presents a similar model stressing the importance of behavioral intentions as well.

Other empirical researchers have provided further support for these theories. Examples of the empirical work on retention that follow this theoretical literature include Nora (1987); Cabrera, Stampen, and Hansen (1990); Cabrera and Nora (1993); and St. John and Starkey (1995). In related work, Wetzel, O'Toole, and Peterson (1999) look at retention over a four-year period at a single institution and find that it is more influenced by academic and social factors than by financial factors. Light and Strayer (2000)

find that the "match" between student ability and college quality is an important determinant of college graduation rates. Students with high academic ability have a much higher probability of graduating from a high quality university than students with low academic ability. Low ability students fare better at lower quality universities, and in accordance with Tinto's theory, high ability students fare less well. Modeling both the persistence and the enrollment decisions, St. John and Starkey (1995) report finding distinct differences between the initial decision to enroll and the subsequent decision to reenroll.

In part as a response to the Tinto model, universities have adopted strategies aimed at better integrating students into university life. This may occur in the form of academic assistance to improve academic integration. It may occur in the form of programs promoting campus-oriented social activities to integrate students more closely into an institution specific social network.

Unfortunately, many retention studies have characteristics that restrict their ability to explain behavior in the larger student population. Many use data from a single institution, most focus on the first to second year (or semester) transition, and few incorporate older or part-time students. Each of these design features imposes its own costs.

First, institution specific studies, particularly those using data from only one year, virtually preclude the use of economic factors. Variation in expected employment probabilities as well as expected earnings is relatively small within a narrowly defined geographic area over a short period of time. This is particularly true when the student body at the institution is relatively homogeneous or when the sample is restricted to recent high school graduates, as is often the case. By contrast, use of a national data set unrestricted by age permits the introduction of geographic variation in unemployment rates and variation in expected earnings by gender, race, and age. The role played by economic factors in the enrollment decision can be identified off this variation.

Second, restricting analysis to the first year or two of enrollment also imposes some limits. In this case, however, the costs are at least partially countered by the benefits. It is, after all, during the first year of enrollment that attrition is highest. In a Department of Education sponsored study (Horn 1998) that uses the same national data set employed here, 16% of students enrolled in four-year colleges and

universities were observed leaving after the first year. Because this time period provides the highest variation in attend/not attend patterns, it follows that, from a policy perspective, this is the most interesting time period to study. Multi-year studies (such as Fenske, Porter, and DuBrock 2000; Murtaugh, Burns, and Schuster 1999; and Heiberger 1993) must address a wider array of enrollment patterns through more complex statistical techniques or, more often, focus on graduation rates. Though five years of information is available and discussed in this paper, we too focus on enrollment during the first year.

Third and most important given the focus of this paper is the failure of most studies to address part-time enrollment or to include nontraditional students. In many retention studies the dependent variable is binary, indicating simply whether a student did or did not return the following year (or semester). Part-time enrollment is treated as equivalent to full-time enrollment (the student is enrolled or is not enrolled) or is explicitly excluded from analysis. At the same time, many studies consider only at students who enter a four-year college directly after high school, thus excluding both non-traditional enrollment and non-traditional students. Placing part-time students into the same pool as full-time students may bias the empirical results while excluding non-traditional students and patterns places substantial restrictions on the scope of the analysis.

Failing to incorporate these nontraditional students effectively excludes a significant fraction of the student population. National statistics indicate that in 1999 approximately one in five students attending a four-year college was enrolled part-time and one in four was over the age of 25. Many more individuals attend two-year institutions and transfer. Single institution studies and studies focusing on more traditional students have sometimes been justified because they restrict the analysis to a more homogeneous group and thus may yield results that are less sensitive to specification changes (see Volkwein and Lorang 1996 for example). This approach, however, severely limits the extent to which the results may be generalized to the student population as a whole, especially if that population is demographically different from the student sample used. Furthermore the reliance on traditional students is not necessary empirically. The marginal impact each explanatory variable has upon the enrollment

decision can be allowed to differ for different population groups.

Motivated in part by the empirical evidence that a substantial fraction of college students are nontraditional in terms of age and enrollment status, a number of researchers have begun looking at these populations. In one of the earlier studies, Bean and Metzner (1985) present a summary of the relevant literature on nontraditional students and develop a conceptual model of attrition for this population. The chief difference they perceive between nontraditional and traditional students is that the Tinto social integration role within the college environment is likely to be less important and the external environment (like employment situation and family considerations) more important for nontraditional students relative to traditional students. In later work (1987) using a sample of 624 part-time, freshman commuter students from a large (13,000 undergraduates) urban university in the Midwest, these authors find empirical support for their hypothesis.

Other work examining attrition by nontraditional students includes a series of papers published by the U. S. Department of Education, and dissertations by Tynes (1993) and Starkey (1994). One of the Department of Education publications (1998) found significantly higher attrition amongst those initially enrolled part-time at a four-year institution when unadjusted for other factors. After controlling for such factors as age, however, part-time enrollment was not found to be significant determinant of attrition. The dissertations focus on students over the age of 24 (Tynes) and on part-time students (Starkey). Both employ a logit model to explain semester-to-semester enrollment in the 1986-1987 academic year using a nationwide sample from the National Postsecondary Student Aid Study. Tynes finds a number of variables related to attrition for the older population, but does not estimate an attrition model for younger students, making it difficult to determine how or whether age has an impact on the probability of continued enrollment. Starkey presents the results of an attrition model for both part-time and full-time students. He finds substantial differences between these two population groups, particularly in terms of sensitivity to financial aid packages. Since many scholarship opportunities and loan programs are primarily designed for full-time students, these results are not unexpected. However, his specification requires that students be identified as part-time or full-time and does not recognize that enrollment status

can change over time.

Volkwein and Lorang (1996) take an alternative approach, focusing on the differences between students taking different paths rather than the paths taken by different students. They find evidence that those who take longer to graduate are more likely to have enrolled part-time and that part-time enrollment is selected in part by good students seeking to maintain high GPAs and in part by students who have higher than average levels of financial aid. By comparison, students who fail to graduate in four or five years have, on average, significantly greater academic difficulties.

Theory/Model

Thus, there exists a rich literature addressing enrollment and another addressing persistence. The latter is steadily expanding to accommodate nontraditional students and enrollment choices, but still has considerable ground to cover. In this paper we build upon elements from each of these literatures to examine the initial enrollment decision and the decision to reenroll, paying particular heed to the decision to enroll part-time and to the role of economic factors in this decision process. We begin by outlining an economic model of enrollment and then expand upon this model to distinguish between part-time and full-time enrollment and to accommodate revisions or changes in enrollment status.

One standard economic approach to modeling enrollment derives from human capital theory. According to this theory individuals invest in training today if the cost of that training is at least covered by the expected future benefits, appropriately discounted. If the costs and benefits are all monetary and the choice is simply between remaining in school and leaving school to obtain a job, then individuals will continue to invest in schooling so long as the net present value of their future earnings stream with the additional schooling exceeds the net present value of their future earnings stream without the additional schooling.

(1) $$NPV_{College} = \sum_{t=0}^{T_G} \frac{-C_t}{(1+r)^t} + \sum_{t=T_G+1}^{T} \frac{W_{t-T_G-1}^{C}}{(1+r)^t}$$

(2) $$NPV_{High\ School} = \sum_{t=0}^{T} \frac{W_t^{HS}}{(1+r)^t}$$

(3) $$NPV_{College} - NPV_{High\ School} = \sum_{t=0}^{T_G} \frac{-C_t - W_t^{HS}}{(1+r)^t} + \sum_{t=T_G+1}^{T} \frac{W_{t-T_G-1}^{C} - W_t^{HS}}{(1+r)^t}$$

These net present value measures (NPV) are illustrated above for a college graduate (1), for a high school graduate (2), and for the difference between the two (3). C represents the direct costs associated with college, W^{HS} reflects the wage a high school graduate would earn, W^{C} the wage a college graduate would earn, r the discount rate, T_G the time it takes to complete the college degree, and T the year in which the individual retires. The subscript t allows direct costs and wages to vary over time. This allows wages to vary with experience as well as with education level.

If the difference between the NPV of a college graduate and the NPV of a high school graduate is positive, then the individual is better off going to college. If the difference is negative then the individual is better off not going to college. Factors that significantly influence this decision include: the opportunity cost associated with attending school, the direct cost associated with attending school, the expected wage differential attributable to the additional education, the time it takes to complete the college degree, the length of time the respondent expects to work, and the rate at which future earnings are discounted.

In the standard model, an individual either enrolls in college or works and cannot do both. Thus, the principal cost associated with college attendance is the opportunity cost measured as the individual' s foregone earnings while enrolled (W_{HS}). The more attractive the employment opportunities for a high school graduate, as measured both by employment probabilities and wages, the less likely that individual

is to attend college, everything else being held constant.

Direct costs (C) include tuition and other mandatory charges, books, and any other expenses that would not be incurred if college were not attended. As individuals would have to pay for their room and board in some manner whether or not they attended school, these costs are typically not considered a cost of college. They may, however, matter if capital markets are imperfect and individuals cannot borrow against their future earnings. The greater the direct costs associated with college, the less likely any individual is to attend college.

Of course, no one would attend college if there were no benefit to doing so. This benefit is typically measured as the difference between the wage a high school graduate would receive and the wage a college graduate would receive ($W^C - W^{HS}$). A recent study by Zucker and Dawson (2001), using the data from High School And Beyond (HS&B) survey, found that students with a bachelor's degree earned about 23 percent more than those with no college experience ten years after graduating from high school. Students with an associate's degree earned about nine percent more ten years after high school graduation compared to those with no college experience. The lower the differential, the lower the probability an individual will attend college.

Holding the wage differential constant, both time factors and the discount rate matter. The less time it takes to obtain a college degree (the lower is T_G), the less the cost of the degree. More able students may be able to complete school more quickly (with a higher probability, and with lower psychic pain or even with psychic benefits if they enjoy the academic or social side of college) than less able students. More able students should, therefore, be more likely to attend college. Individuals who expect more years of employment should also be more likely to attend college. The greater is T, the greater is the return to the investment. This factor explains why most college students are very young. If the investment is worth making, then it is worth more the greater is T. Finally, individuals who discount future earnings less (have a lower r) are more likely to attend college because they are more willing to wait for the benefits than those who discount future earnings more.

College attendance in this simple model is portrayed as a continuous period of full-time investment in job related human capital. However, the empirical evidence clearly indicates that enrollment status is not always continuous (some individuals stop-out or dropout after beginning work towards a degree) and that a significant number of individuals enroll on a part-time basis. The analysis below extends the simple model to distinguish between part-time (PE) and full-time (FE) enrollment and to encompass the persistence literature, which focuses on the decision to reenroll.

Extending the model to distinguish between part-time and full-time enrollment requires considering how the costs and benefits to enrollment differ by enrollment intensity. Potential differences exist in almost every dimension. Consider the equations below:

$$(4)\ NPV^{FE}_{College} = \sum_{t=0}^{T_G^{FE}} \frac{-C_t^{FE} + \gamma^{FE} W_t^{HS}}{(1+r)^t} + \sum_{t=T_G^{FE}+1}^{T} \frac{W^C_{t-T_G^{FE}-1}\left(\gamma^{FE}, T_G^{FE}\right)}{(1+r)^t}$$

$$(5)\ NPV^{PE}_{College} = \sum_{t=0}^{T_G^{PE}} \frac{-C_t^{PE} + \gamma^{PE} W_t^{HS}}{(1+r)^t} + \sum_{t=T_G^{PE}+1}^{T} \frac{W^C_{t-T_G^{PE}-1}\left(\gamma^{PE}, T_G^{PE}\right)}{(1+r)^t}$$

$$(6)\quad NPV^{PE}_{College} - NPV^{FE}_{College} = \sum_{t=0}^{T_G^{FE}} \frac{C_t^{FE} - C_t^{PE} + (\gamma^{PE} - \gamma^{FE}) W_t^{HS}}{(1+r)^t} +$$

$$\sum_{t=T_G^{FE}+1}^{T_G^{PE}} \frac{-C_t^{PE} + \gamma^{PE} W_t^{HS} - W^C_{t-T_G^{FE}-1}\left(\gamma^{FE}, T_G^{FE}\right)}{(1+r)^t} + \sum_{t=T_G^{PE}+1}^{T} \frac{W^C_{t-T_G^{PE}-1}\left(\gamma^{PE}, T_G^{PE}\right) - W^C_{t-T_G^{FE}-1}\left(\gamma^{FE}, T_G^{FE}\right)}{(1+r)^t}$$

Equation (4) reflects the NPV associated with attending college on a full-time basis, equation (5) the NPV associated with attending college on a part-time basis, and the final equation the NPV associated with attending college on a part-time as compared to full-time basis. The superscript FE (PE) refers to full-time (part-time) enrollment. The direct costs of enrollment (C) are assumed to differ for full-time as compared to part-time students. The time enrolled (T_G) is also assumed to differ by enrollment status. γ^{FE} (γ^{PE}) is a multiplier that reflects the fraction of earnings an individual enrolled full-time (part-time) can expect to receive while enrolled. γ reflects both the fraction of time an individual works as well as the

type of job he/she obtains while enrolled. An individual who is enrolled full-time is more likely to choose a job that fits his/her class schedule than to arrange a class schedule around his/her hours of employment. Conversely, an individual who is enrolled part-time is more likely to choose classes that fit his/her employment schedule than to arrange employment around his/her class schedule. Wages are likely to be higher for individuals who face fewer time constraints upon their employment. Thus, individuals who are working full-time and enrolled full-time are likely to have lower wages than individuals who are working full-time and enrolled only part-time, all else constant.

Finally, the wages of a college graduate are expected to differ depending upon the work experience garnered while enrolled. Thus the wage of a college graduate (W^C) is modeled as a function of both γ and T_G. Those enrolled full-time (with γ_{FE}) likely held a job with more responsibility and higher wage growth in the 15th year following initial enrollment than those who were enrolled part-time, assuming both started in the same year and both have completed college. This differential arises because those who were enrolled full-time graduated sooner and have held their post-graduation job longer. The longer one has been on a job, the more likely one is to receive a promotion and still higher wages and greater responsibilities.

Certain differences are expected ex-ante between full-time and part-time enrollment. Namely,

$$C^{FE} > C^{PE}$$

$$T_G^{FE} < T_G^{PE} \tag{7}$$

$$\gamma_{FE} < \gamma_{PE}$$

Direct enrollment costs such as tuition are expected to be higher per term for full-time as compared to part-time students. Time to graduation is expected to be shorter for full-time as compared to part-time students. The earnings of full-time students are expected to be less than the earnings of part-time students while in college, all else equal. All these expectations are supported by empirical observation. The latter expectation is the least well documented, but national statistics indicate that while 14.5% of all full-time

college students were employed full-time, 70.0% of all part-time college students were employed full-time in 1999.

Part-time enrollment becomes attractive when the NPV of part-time enrollment is greater than the NPV of full-time enrollment or when the last equation is positive. This is more likely the lower the direct costs of part-time enrollment (C^{PE}), the higher the direct costs of full-time enrollment (C^{FE}), the higher the earnings of those enrolled part-time as compared to those enrolled full-time (suggesting a higher W^{HS}, a higher γ_{PE}, and a lower γ_{FE}), the greater the time spent enrolled full-time (T_G^{FE}), the shorter the time spent enrolled part-time (T_G^{PE}), the lower the wages for a college graduate who enrolled full-time, and the higher the wages for a college graduate who enrolled part-time. The effect of T on the decision to enroll part-time depends upon the sign of the final term in equation (6).

Employment opportunities are clearly an important consideration. If employment is not possible for anyone enrolled in college ($\gamma_{FT} = \gamma_{PT} = 0$), then part-time enrollment would only make sense if the direct costs of part-time enrollment were substantially less than those for full-time enrollment ($C^{PE} << C^{FE}$) and the difference in time to graduation were very small ($T_G^{PE} \approx T_G^{FE}$). Even then, one would only enroll part-time if that were better than not going to college at all. The opportunity costs in terms of the foregone earnings (W^{HS}) then become critical.

Employment while enrolled significantly reduces the bite of these foregone earnings and increases the probability with which an individual will enroll in college. If the earnings potential of those enrolled part-time is substantially greater than the earnings potential of those enrolled full-time ($\gamma_{PT} >> \gamma_{FT}$) then part-time enrollment also gains in attractiveness relative to full-time enrollment. In an extreme case, $\gamma_{PT} = 1$ and $\gamma_{FT} = 0$ meaning that part-time college students can earn as much as high school graduates while full-time college students do not work at all. In this case, an individual would enroll so long as higher future earnings recouped the direct costs of college and would enroll part-time so long as the higher near term benefits of part-time enrollment ($C^{FE} - C^{PE} + W^{HS} > 0$) were large enough to offset potentially lower future values.

Potential losses arise in both the second and third terms of equation (6). In the second term, $-C^{PE} + W^{HS} - W_{FE}^{C}$ is very likely negative. Figures from the 1990 Census indicate that the earnings of full-time, full-year male high school graduates between the ages of 25 and 29 average about $22,360 while those of full-time, full-year male college graduates between the ages of 18 and 24 are $23,430. Thus newly minted college graduates earn more than fairly experienced high school graduates. This implies that W^{HS} is less than W_{FE}^{C} even without the addition of part-time enrollment costs. Similarly it seems reasonable to suppose that $W_{PE}^{C} - W_{FE}^{C}$ will be negative in most cases since earnings tend to rise more rapidly with experience for college graduates than for high school graduates. If this is the case then part-time enrollment will be more attractive for those closer to retirement (with a lower T) as this will lower the disadvantage of part-time enrollment. Overall, the decision to enroll part-time rather than full-time is quite dependent on how wages for full-time and part-time students differ following graduation.

Part-time enrollment may also be justified on other grounds. First, less able students may need more time to study than more able students in order to maintain an acceptable GPA. Second, family circumstances and imperfect capital markets may make employment during college a near necessity and this employment may make full-time enrollment impossible. Third, alternative uses of time may take priority. Some individuals are likely not deciding between work and school but between household responsibilities and school. Part-time students may be able to continue their role as full-time parent and housekeeper, again reducing the opportunity costs associated with college enrollment. Part-time enrollment may be particularly attractive to those who have delayed entry and hence have a greater opportunity cost due to full-time employment or household responsibilities. Delayed entry also suggests a shorter time horizon, which could also favor part-time over full-time enrollment.

This analysis assumes that enrollment status is fixed and invariant during the enrollment period. The persistence literature clearly documents that this is not the case. The decision to seek a college degree is contingent upon many factors. While current costs may be known (particularly for those familiar with the labor market), future costs and benefits are uncertain and expectations regarding these

factors may change over time. Essentially the persistence decision can be thought of as a Bayesian updating of the original decision to attend college, and to attend on a full-time or a part-time basis. Individuals may use information on their academic performance to update their probability of completing school. Those students who are having particular difficulty may decide that the benefits of attending school are less than the costs and drop-out or they may decide that they have to expend more effort per course taken and move from full-time to part-time status. Individuals trying to juggle work and school may learn that it is more difficult than they anticipated, forcing them to choose between work and school or to change either their enrollment or their work status to part-time. Those with better employment prospects may find it more difficult to justify college enrollment. For example, those who are promoted or asked to work longer hours may be more likely to adjust their educational time path. Changes in the composition of the student's household, such as changes in marital status or the birth of a child, may also significantly influence the perceived costs and benefits to college attendance. Any updating or revision in the costs or benefits of pursuing higher education could lead to changes in enrollment status.

Some evidence that this sort of economic cost-benefit analysis is relevant to the enrollment decision appears in Light (1996). Light uses data from the National Survey of Youth on individuals who began college but left to estimate a hazard model of the decision to reenroll in school. She finds that the probability of reentering falls as tuition rates and wage rates rise and as the unemployment rate falls. This study also uses information on wages and unemployment rates but further extends the analysis to differentiate between full-time and part-time enrollment.

Data

The data set we use is the 1989-94 BPS survey conducted by the NCES. These data consist of a national sample of 7253 individuals who attended a post-secondary institution for the first time in the 1989-90 academic year. Each respondent is interviewed in 1989-90 and again in either 1992 or 1994. Thus, there exists detailed information regarding the enrollment of each respondent for a period of between two and five years. Unlike the National Longitudinal Surveys or the High School and Beyond

Survey, the BPS does not restrict the sample by age. The youngest respondents are teenagers; the oldest are in their 60's. The sample captures a real cross-section of initial enrollees at post-secondary institutions.

Not all these respondents, however, are actually interested in obtaining a four-year college degree. As our interest is in studying the college enrollment decision, we restrict our analysis to include only those individuals who were enrolled in a degree program and only those institutions that provided credit toward such a program. Individuals who attempted no more than a certificate degree during the survey period or, if this information is not available, who expected to achieve no more than a trade school education, as reported in the 1990 survey and at least one of the follow-up surveys, were excluded from our final sample. Likewise, attendance at institutions offering less than a two-year program of instruction and at institutions offering a non-academic program of study was omitted from the study. The decision to exclude attendance at all institutions offering less than a two-year program of instruction was based on the NCES staff observation that few credits obtained at such institutions could be used towards a Bachelor's degree. The decision to exclude information from two and four-year non-academic institutions was a more difficult one. In all, attendance information from 164 of 788 two-year and 17 of 957 four-year institutions was deleted. The schools that were excluded at this stage were primarily bible schools, technical or business colleges, culinary institutes, and beauty/art schools. Attendance at such institutions accounted for less than three percent of available term records.

We constructed a term-by-term enrollment history for each of the remaining individuals. To do so, all terms were forced to match a semester or quarter based calendar system. Short intersessions (such as are typical of a 4-1-4 calendar system) were excluded and adjacent summer terms were merged together. Information on individuals who were simultaneously enrolled at several institutions was examined on a case-by-case basis. Schools with four-year degree programs were credited with the enrollment when in competition with local community colleges. Likewise if a respondent attended one institution fairly continuously and reported simultaneously attending another at some intermediate point in time, attendance was awarded to the institution more continuously attended[1]. This coding rule was

further extended to grant United States institutions enrollment credit in the case of term or year abroad programs, even if simultaneous enrollment in the U.S. was not reported. As credit hours and payment is typically awarded to the U.S. based institution, this attribution seems appropriate.

In all, these restrictions reduce the sample to 5665 respondents. Seventy-five percent of those excluded were excluded because they never attempted a degree. Removing those individuals who did not first enroll in an academic institution until after the 1989-90 academic year (160), those who were enrolled only during the summer of that year (13), those who reported graduating in less than 4 terms (6), those who were selected into the sample because of their attendance at less than 2 year institutions (13 - removed in order to accurately control for the complex sample design), and those who did not provide information on their race (2) yields the final sample of 5471 individuals.

The BPS provides detailed information on each of these individuals for a period of between two and five years. Personal data on gender, race, ethnicity, and age is available. Information on marital status and household composition is recorded on a term-by-term basis, as is information on enrollment, including part-time/full-time status. Some information on college GPA is available during the first, third, and final years of the survey. The number of different schools attended and basic information on these schools is also available. Household income data are available as is information on loan receipt, social and academic integration measures, parental education, self-reported academic ability, socioeconomic status, and a myriad of other measures.

Matched to this sample is information garnered from the Census Bureau and the Department of Labor Statistics. The 1990 Census provides mean annual earnings measures for full-time, full-year workers by education level, age, gender, race, and ethnicity. We used the information on high school graduates' earnings to proxy for expected earnings. As individuals are likely to have reasonable information on earnings differences by age and gender, we allowed for differences in these dimensions. However we distinguished only between white non-Hispanic, black non-Hispanic, white Hispanic, black Hispanic, and other in matching data by race and ethnicity. We tried several alternative measures to capture the earnings differential an individual might expect upon completion of a college degree.

Unfortunately, an individual who completes college at age 30 cannot expect to earn what a 21-year-old college graduate earns at age 30. Thus the detailed information provided on college graduates earnings by age is not of particular value in this case. Instead we calculate the ratio of college to high school earnings for those with approximately no work experience. These measures differ by gender and by the race/ethnicity categories described above, but are assumed to be similar by age. This is likely a relatively poor measure of relative earnings potential for a college graduate. Finally, Current Population Survey estimates of the 1989 unemployment rate are matched to the respondents' reported home state. Several different measures are tested, but those used for most of the analysis differ by age – with teenagers having the teenage unemployment rate and others having the overall state average. Ideally we would differentiate further by age and somewhat by race and ethnicity but such detailed measures are not available. Overall, however, these measures should help capture some of the economic costs associated with college enrollment.

Sample Statistics

Using these rich data we are able to construct a more detailed picture of enrollment for the entering class of 1989 than has to our knowledge yet been attempted. Previous reports based on the 1989 BPS (for example, U.S. Department of Education 1998) provide excellent information on those attending 4-year or 2-year institutions at the outset, but have not attempted to isolate those pursuing a degree program or to identify respondents' term-by-term enrollment status. Our more precisely defined data set allows us to identify single term stop-outs and to differentiate between summer and non-summer enrollment.

More importantly, however, use of the 1989-94 BPS allows us to obtain more than the simple snapshot of enrollment activity that is typically reported. While standard enrollment statistics report the fraction of enrolled students who are over the age of 24 or are enrolled part-time at a single point in time, they can provide no more detailed personal or enrollment information. Information on stop-out behavior and changes in enrollment status in particular cannot be ascertained from a single cross-section of data.

Unless individuals maintain the same enrollment status for the duration of their college career, simple cross-section analysis will underestimate the prevalence of non-traditional enrollment patterns. Data from the BPS track individuals for approximately five years no matter their enrollment status, allowing construction of a more accurate picture of the dynamics of the enrollment decision.

For comparison purposes, sample statistics from the 1989-94 BPS are presented side by side with 1997 enrollment statistics from the 1999 Educational Digest. The BPS estimates are presented in column 1 of Table 1, the 1997 measures in column 2. The BPS figures reflect only that sample of individuals interviewed in 1994 (5027 of the 5471 respondents) and are weighted to reflect the national population. In order to present statistics as comparable as possible to those culled from the 1989-94 BPS, the 1997 enrollment statistics are restricted where possible to degree-seeking, first-time freshmen. Exceptions are noted in the table.

Where available, the 1997 data are remarkably similar to the 1989 BPS. The fraction of women is 53% in the BPS sample and 54% in the 1997 sample. The fraction of white, non-Hispanics is greater in the BPS sample (at 80% versus 71%) while the fraction of black, non-Hispanics and those of other races is smaller, but these differences are likely attributable to the different sample years. White, non-Hispanics have become a smaller fraction of the overall population and the BPS sample was drawn nine years before the 1997 sample. Indeed, looking at all undergraduate students, white, non-Hispanics constituted 77.5% of the population in 1990 but only 70.6% in 1997. Information on the age of first-time, degree-seeking freshmen is unfortunately not available. Those measures reported in 1997 are for all undergraduates. The inclusion of both upper division students and non-degree seekers increases the sample age considerably. The only remaining 1997 figures available indicate the type of school initially attended (public/private, 2/4 year) and the prevalence of part-time enrollment during the first term. As with the gender and race measures, these are very similar across samples. In each case, about half start college enrolled at a school that offers a full four-year program and about 80% start at a public institution. The 1989-94 BPS data used here are remarkably similar in composition to the 1997 national cross-section.

As stated earlier, however, the 1989-94 BPS sample provides substantially more personal and enrollment information as is evidenced by all the information provided in column 1 but not column 2 of Table 1. These data indicate that about 79% of these first-time freshmen came to college directly after completing high school, but 6.5% delayed entry at least ten years. Similarly, 80% are less than age 20, while 9.4% are over age 24. These students come from diverse backgrounds with 6% having no parent who completed high school and 17% having a parent with post-graduate training. Almost 17% were not dependent upon their parents, though only 10% were or had been married. Almost 17% have children of their own.

Looking at enrollment during non-summer terms only, we find substantial variation in the number of terms attended, the end of interview status, and the number of schools attended. Respondents report attending between 1 and 16 terms. After converting quarters to a semester equivalent, we obtain the following breakdown. Only 6% report stopping after one term, but almost 20% complete no more than one year of college. 33% remain enrolled for no more than two years, 49% for three years of less, and 74% for four years or less. Twenty-nine percent have graduated by the time of the last survey and another 22% are still enrolled. Over 62% attend only one institution during that time; another 29% attend only two. Some individuals attend as many as five different colleges. While we do not examine the decision to enroll during the summer, we do know that over 56% of our weighted sample never attends in the summer, while another 25% enroll for only a single summer term.

Of particular importance from our perspective is the information provided on enrollment patterns, specifically part-time, full-time, and stop-out behavior. This information will reveal the extent of non-traditional enrollment. The more common is part-time enrollment and stop-out, the more important it is to study such behavior. While it is always known whether or not an individual is enrolled during a particular term, making stop-out behavior relatively straightforward to monitor, part-time/full-time status is not always observed. In fact, part-time/full-time status is unknown for at least one non-summer term for almost 16% of the sample. Fortunately it is completely unknown for only six percent of the sample[2].

While studies have historically focused primarily upon those students enrolled full-time, these

statistics indicate that at least 40% enroll part-time for at least one non-summer term. No more than 60% of this national sample of students first enrolled in college in 1989-90 was enrolled exclusively on a full-time basis. This figure conservatively assumes that every instance of missing enrollment status reflects full-time enrollment. If all missing enrollment data are instead assumed to reflect part-time enrollment, the fraction attending exclusively full-time falls to 48%. Even this figure assumes that those who have not yet graduated never attend part-time in the future.

These data also reveal substantial variation in enrollment status. Individuals do not choose full-time enrollment or part-time enrollment and stick with the same status forever. At least 29% of the BPS sample is observed changing status at least once during their academic career.

As stated earlier, stop-out behavior is much easier to identify. An individual is determined to have stopped-out if he/she is observed enrolled, not enrolled, then enrolled during a sequence of terms. In this manner we are able to identify even a one term stop-out. By contrast, an individual who is not enrolled at the conclusion of the final survey and has not yet received a Bachelor's degree is classified here as having dropped out. Stop-out and dropout are identified separately; thus an individual can be classified as both. Some who have dropped out may simply be stopping out, thus stop-out behavior is likely underestimated because of the finite duration of the panel.

Even so, over 30% of this sample is observed stopping-out. Stop-out behavior is more likely for those attending more than one institution (47% of whom stop-out) and those attending part-time for at least one term (44%), but is still observed in 20% of the sample attending only one institution or attending exclusively full-time. Stop-out behavior is not unusual.

Snapshots showing college enrollment at one point in time indicate that 33% of all degree-seeking students in a given term are enrolled part-time. This is a substantial fraction and it alone demonstrates the need to examine non-traditional enrollment patterns. However simple cross-section analysis provides no information on enrollment status over time or on stop-out behavior. Combining information on stop-outs and part-time enrollment (results not reported in table), we find that conservatively 52% of this national sample of 1989-90 college freshman were observed enrolling part-

time or stopping out for at least one term prior to the conclusion of the 1994 interview. Thus, the study of nontraditional enrollment such as part-time and stop-out behavior is even more urgent than cross-section studies suggest.

The Initial Enrollment Decision

As a first step towards such an analysis, we examine the initial enrollment decision. Our data consist exclusively of individuals who have enrolled at a post-secondary institution during the 1989-90 academic year. Thus, we cannot examine the decision not to enroll, only the decision to attend part-time rather than full-time. All the analysis reported in this paper conditions on the decision to enroll during the 1989-90 academic year.

To examine the initial enrollment decision, we restrict the sample to only those whose first term part-time/full-time status is known[3]. As we need information only from 1989-90, individuals who were interviewed in 1992 but not in 1994 can be included in the sample. The weighting function is adjusted accordingly. The resulting sample consists of 4595 respondents, 344 of whom (7.5%) were initially enrolled part-time. The much higher weighted incidence of part-time enrollment (17.9%) indicates that those initially enrolled part-time were under-sampled relative to those initially enrolled full-time. As shown in Table 1, the fraction of degree-seeking first-time freshmen who were enrolled part-time during the fall of 1997 was a similar though somewhat larger 21.9%.

Sample statistics by initial enrollment status are reported in Table 2. All statistics and significance levels take into account sampling weights, clustering, and stratification, as is necessary to fully accommodate the complex sample design of the BPS (see Dowd 2001 for further information). The variables presented in Table 2 are for the most part those used in the multivariate analysis. They consist of individual specific characteristics such as gender, race, and ability; background characteristics in the form of parental education; household characteristics such as marital status; and finally economic measures of opportunity cost. Institution specific information is not included in the empirical model, and hence not reported here, because we believe that the decision to attend on a part-time basis and the

institutional choice may be made jointly. If this belief is correct, estimation of enrollment status as a function of institution specific characteristics will result in simultaneity bias. To avoid such bias we estimate what is essentially a reduced form specification that excludes all institution specific information.

An analysis of the individual specific characteristics reveals a number of notable results. For example, race (p-value 0.83) and gender (p-value 0.88) do not differ significantly by initial enrollment status, but Hispanic ethnicity does (p-value 0.00). Of those initially enrolled full-time, 5.7% are Hispanic as compared with 16.0% of those initially enrolled part-time. Enrollment statistics for degree-seeking first-time freshmen in 1997 suggest a similar pattern with Hispanics representing 7.3% of all full-time students and 11.4% of all part-time students.

Another individual characteristic typically included in enrollment studies is academic ability. As discussed in the theory section, individuals who are less able may be more likely to enroll part-time to test the waters and reserve more time for study. Ideally, a relatively objective measure of ability such as a test score would be used to test this hypothesis. Unfortunately, SAT and ACT scores are missing for almost 50% of this sample. Simple self-reported ability measures are missing for only about 50 respondents (for whom average ability is assumed). To construct these measures, individuals were asked to rate their overall, verbal, and math skills as either above average, average, or below average. The ranking of self-reported math skills was found to be a more significant determinant of initial enrollment status than either self-reported overall or verbal skills. This measure of math skills is significantly positively correlated with both SAT and ACT test scores. Not surprisingly it is most highly correlated (0.46) with the math SAT score. A test of the hypothesis that self-reported math ability is uncorrelated with initial enrollment status is rejected at even the 1% significance level. Statistics indicate that 32% of respondents enrolled full-time report having above average math skills as opposed to 18% of respondents enrolled part-time.

Also included initially as a measure of academic ability is an indicator of the type of high school degree the respondent received. A dummy variable is created that takes on a value of one when the respondent did not receive a high school diploma in the traditional manner, but instead received a GED or

other certificate. As expected, those without a traditional high school diploma are more likely to enroll initially on a part-time basis.

Family background measures are included to capture both emotional and financial support for educational goals. Individuals whose parents have attended some college are presumed to be more likely to have their parents' support for higher education. Simple statistics provide some evidence for this hypothesis. While 55% of those enrolled full-time reported that their parents completed some college or more, only 17% of those enrolled part-time reported the same background. Overall, the hypothesis that parental education is similar for those enrolled full-time and those enrolled part-time is rejected (p-value 0.00).

The next variables listed in Table 2 are those describing the economic independence of the respondent as well as his/her familial obligations. As expected individuals who are older, independent from their parents, married, and/or have children of their own are substantially more likely to be enrolled part-time. For example, whereas 5% of those enrolled full-time have ever been married, 36% of those enrolled part-time have been. These factors all suggest a greater opportunity cost of time as individuals with these characteristics have fewer resources upon which to fall back when supporting themselves in school, potentially more dependents depending upon them for support, and higher expected salaries that they risk foregoing in the event that they do enroll.

The final rows in Table 2 present information pertaining more directly to the foregone earnings of the respondents. The unemployment rate in the respondents' state of residence is incorporated both for the population as a whole and differentiated by age. It is expected that the higher the unemployment rate, the less likely one could obtain a job and hence the lower the opportunity cost associated with college enrollment. Higher unemployment rates are expected to reduce the cost of full-time enrollment and in fact sample statistics indicate that unemployment rates are higher for those enrolled full-time.

The impact of earnings potential on college enrollment status is more ambiguous. Theory clearly indicates that the higher the earnings of a high school graduate, the more likely such an individual will be to enroll part-time. This result is, however, contingent upon the inclusion of adequate controls for

expected earnings following completion of the degree. Such controls do not exist. Information on the average earnings of full-time, full-year workers with a high school degree is obtained by gender, age, race, and ethnicity[4]. Sample statistics indicate that those enrolled part-time have higher potential earnings than those enrolled full-time ($17 versus $15 thousand), as theory would suggest. No such straightforward measure of expected earnings following college graduation exists. Information on the average earnings of full-time, full-year workers with a college diploma is available but a newly minted 35 year old college graduate can not expect to earn as much as a 35 year old who graduated from college over ten years earlier. As an alternative, a measure of the ratio of college to high school earnings for full-time, full-year workers with approximately no experience was constructed by gender, race, and ethnicity. This measure has substantially less variance than the measure of high school earnings, is highly correlated with high school earnings, and shows no variation by initial enrollment status.

Finally, theory suggests that part-time enrollment makes sense from a financial perspective primarily if it allows individuals to keep a job while enrolled. In an attempt to capture the importance of work and actual work experience, two measures of employment were obtained from the BPS. One of these (Work is Very Important) is a dummy variable that takes a value of one for those individuals who reply that it was very important that they choose a school that enabled them to work and go to school. Amongst those initially enrolled part-time (full-time), 72% (34%) agreed with this statement. This measure likely captures the relative importance attached to work. The other measure reflects the actual time spent working as it measures the percentage of time the respondent spent working while enrolled during the first year. Since part-time employment is not distinguished from full-time employment, however, even those enrolled full-time report working an average of 64% of the time they are enrolled. Unfortunately information on full-time employment is readily available for only a portion of the data.

Table 2 reports only simple means by initial enrollment status. In order to control for more than one variable at a time, we estimate a logit model of the initial enrollment decision. The results of this model are shown in Table 3. As discussed above, one of the most important factors driving part-time enrollment probabilities is the work-enrollment tradeoff. However, the decision to work and the decision

to enroll may be jointly determined for some in the sample. Estimation of the enrollment decision as a function of the employment outcome would in this case introduce simultaneity bias. We estimate a variety of different specifications in order to accommodate for this possibility. One of these models (specification 1a) is essentially a reduced form specification that includes no information on the respondent's actual work status. In this case, only the measures of the unemployment rate, of potential earnings, and family characteristics reflecting potential need are included in the model. In addition, we estimate a model (specification 1b) in which we recognize that some individuals may place primary importance on employment and choose to attend college only if it is convenient to do so. In this case, we control for the dummy variable 'Work is Very Important'. If the decision to work precedes the decision to attend school for those individuals who state that it was very important to choose a school that enabled them to work, then inclusion of this measure in the specification will not introduce simultaneity bias. Finally, we estimate a model (specification 1c) in which we include the percentage of time the respondent spent working and attending school during the first academic year. This is the model that is most likely to suffer from simultaneity bias.

The results in Table 3 take into account the complex survey design of the BPS. Thus, consistent parameter estimates are obtained by controlling appropriately for the sampling weights, and accurate standard errors are obtained by taking into account the weights, clustering, and stratification of the sample[5]. The dependent variable takes a value of one when the respondent initially enrolls part-time, else zero. Positive coefficient estimates indicate that respondents with positive characteristic values are more likely to attend part-time. Standard errors are reported in parentheses below the coefficients.

The results differ in some important ways from the simple univariate analysis reported in Table 2. Focusing first on the reduced form specification (1a), women, holding all else constant, are found to be less likely to enroll part-time, while those who are neither black nor white are less likely to enroll part-time. Hispanics are still significantly more likely to attend part-time. Contrary to expectations, those without a high school degree are more likely to attend full-time, perhaps because if they were motivated to complete their high school degree, they are motivated to attend full-time. Those who report having

above average math skills are more likely to attend full-time but there is no significant differential for those reporting below average math skills.

Parental education has a distinctly nonlinear impact on enrollment. Those whose parents did not complete high school are less likely to attend college part-time while those whose parents completed only high school (or trade school) are more likely to attend part-time. Having more educated parents appears to have no significant impact on initial enrollment status. In an attempt to control more precisely for ability to pay, we estimated a model that included three dummy variables representing different levels of parental income (results not reported). These measures were jointly statistically insignificant (p-value 0.58). Information on socioeconomic status also did not help to explain initial enrollment status (p-value 0.88).

Age and family composition clearly had a significant impact on enrollment status. Older students were significantly more likely to attend part-time as were men who were or had been married, and men with teenage children. Marital status has no significant impact upon enrollment status for women (p-value 0.53), neither (surprisingly) does family composition (p-value 0.32). Independence alone was not a significant determinant of enrollment status, as might be expected given the financial incentive households have to declare students to be self-supporting. Parents are expected to contribute to the education of their offspring, provided they are still dependents. Independent persons stand a much better chance of obtaining financial aid, and often obtain parental support as well. Therefore some of those who declared themselves independent were likely still receiving parental support.

The impact of the unemployment rate on initial enrollment status is negative as expected. The higher the unemployment rate in an individual's state of residence, the higher is the probability with which that individual will enroll full-time. This effect persists but is less statistically significant when the unemployment rate does not distinguish between teenagers and older persons.

The final two variables included in specification (1a) are the expected earnings measures. The first represents expected earnings as a high school graduate. The second is the estimated ratio of college to high school earnings. Although theory predicts that individuals with higher high school earnings

should be more likely to enroll part-time, these results indicate that higher high school earnings significantly increase the probability of full-time enrollment. This finding is likely caused by the high degree of correlation between expected high school and expected college earnings and the poor measure of expected college earnings.

Specifications (1b) and (1c) add controls for the importance assigned to employment and actual employment behavior respectively. Perhaps because work intensity is not measured in specification (1c) and many students work part-time, specification (1b) provides the better fit as measured by both the fraction of observations correctly predicted and the mean sum of the squared residuals.

Inclusion of these variables has surprisingly little impact on the magnitude or significance of other coefficients in the model. The coefficients to women, Hispanics, and those with above math skills are virtually identical in specifications (1b) and (1a). Most of the others are within one standard error. Some of the largest differences arise for the coefficient to parental education at the high school level and the coefficient to children age 13-18 both of which decline in magnitude. These are likely factors that make work particularly imperative (low parental income and the presence of expensive teenagers). Including a more direct measure of employment preferences reduces their explanatory power.

The estimated coefficient to high school earnings also falls about 15% in specifications (1b) and (1c) as compared to (1a). In results not reported here, specification (1b) was estimated including an interaction term between the high school graduate earnings measure and the "Work is Very Important" measure. Both the coefficient to "Work is Very Important" and the coefficient to the interaction term were positive and statistically significant. A test of the hypothesis that potential high school earnings have no impact on those who felt it was very important to choose a school at which they could work could not be rejected (p-value = 0.26). Thus, those who felt it was very important to choose a school that would accommodate their work schedule were significantly more likely to be enrolled part-time, but were not further influenced by their potential earnings. Those in the sample who did not feel it was very important to choose a school that would accommodate their work schedule were more likely to enroll full-time the higher their potential earnings. One interpretation of these results is that the potential earnings measure is

highly correlated with future earnings. Those who tried to choose a school that was compatible with work were perhaps less concerned about the cost incurred by extending their enrollment period because they were more likely to be working already. Those who were not as likely to be working now perhaps perceived higher earnings as a higher cost to delaying graduation and so were more likely to enroll full-time.

The sign and significance of the coefficient estimates reported in Table 3 are clearly interpretable. The magnitude of the estimates is more difficult to evaluate. In an attempt to convey this information, we present in Table 4 predicted probabilities of part-time enrollment for individuals with different personal, background, household, and employment characteristics. The base case against which all comparisons are made is that of a 19 year old white, non-Hispanic male with a high school diploma, average verbal ability, and parents upon whom he is still dependent who attended some college. The unemployment rate used is the average U.S. unemployment rate for teenagers and the opportunity cost and ratio measures are those for white, male, non-Hispanic teenagers. Columns (1) and (2) present results from the reduced form specification (1a).

One complication introduced to these predictions is that a change in the gender, race, ethnicity, and/or age of an individual generally changes the value of several variables in the model. For example, to predict the initial enrollment status of a woman one would need to change the value of the variable Female to 1 **and** change the value of the two earnings measures to reflect the different average earnings potential of a woman. To predict the initial enrollment status of an older person, the value of Age and Age Squared would of necessity change, but so would the measure of potential high school graduate earnings and the measure of the unemployment rate. In order to illustrate how a change in only the indicator variables and not the unemployment or earnings measures would affect the initial enrollment outcome, we present two sets of predictions for the reduced form specification (1a). Predictions that maintain the base case earnings and unemployment rate values are presented in column (1). Column (1) is left blank where the adjusted and unadjusted measures are identical. Predictions that change all gender, race, ethnicity, and age relative values are presented in column (2).

The predicted probability of part-time enrollment for an individual with base case characteristics using the reduced form model (specification 1a) is 7.7%. The coefficient to Female is significant and negative in the model indicating that women have a significantly lower probability of enrolling part-time than men, holding all else equal. Indeed, holding all else equal, a woman with base case characteristics has only a 4.0% probability of initially enrolling part-time. However, women have substantially lower expected earnings than men ($13,272 versus $16,745 for the base case) and when these are taken into account (see column 2), their probability of part-time enrollment is no different than that for men (7.8% for women versus 7.7% for men). Similarly being black and being Hispanic increase the probability of part-time enrollment all else equal, while the lower expected earnings of these groups further widens the differential. Approximately fifteen percent of the difference between the fully adjusted Hispanic enrollment probability and the base case enrollment probability is due to earnings differences.

These predictions demonstrate that the unemployment rate as a measure of opportunity cost has not only a significant effect on part-time enrollment probabilities but also a substantial one. The teenage unemployment rate ranges from 5% to 25% within the data set. Changing the unemployment rate from the base case value of 15% to 10% almost doubles the predicted probability of part-time enrollment from 7.7% to 13.6%. Clearly economic considerations are a significant factor in the enrollment decision.

The remainder of Table 4 demonstrates the importance of age and marital status for men and women. While independence alone has little influence on the probability of part-time enrollment (increasing it from 7.7% to 10.9% for a 19 year old), age does have a significant effect. Being independent and age 25 increases the probability of part-time enrollment by a factor of almost 4, all else equal (to 27.2% versus 7.7%). Being independent and age 35 doubles this rate again, all else equal (to 53.0%). However older persons face lower unemployment rates that increase the probability of part-time enrollment and higher potential earnings that decrease the probability of part-time enrollment. The effect of the unemployment rate dominates for 25 year olds as the fully adjusted probability rises to 31.7% from 27.2%. The effect of the earnings measure dominates for 35 year olds as the full adjusted probability falls from 53.0% to 29.1%. Independent, 35 year old women have a substantially higher probability of being

enrolled part-time (61.2%), partly because of their gender alone (the unadjusted probability of part-time enrollment for independent women age 35 is 36.0%), but mostly because of their lower expected earnings. Marriage increases the probability of part-time enrollment for both men and women, but the difference attributable to marriage is substantially greater for men (50.8%-29.1% = 21.7% versus 71.8%-61.2% = 10.6%).

Predictions for specifications (1b) and (1c) are presented in columns 3 and 4 of Table 4 respectfully. The base case for specification (1b) additionally assumes that work is not very important. The base case for specification (1c) assumes that the individual was not employed at all. Both sets of predictions are fully adjusted for earnings and unemployment rate differences by gender, race, ethnicity, and age.

Particularly noteworthy is the finding that the predicted probability of part-time enrollment is much smaller under the base case and the impact of the work related variables substantial. The probability of an individual with base case characteristics being enrolled on a part-time basis falls from 7.7% in the reduced form model to 4.3% in the model specifying the importance of work and 2.9% in the model controlling for the fraction of time spent working while enrolled. The probability of being enrolled part-time increases three-fold if an individual with base case characteristics states that work is very important or works 100% of the time while enrolled. Controlling for employment in this manner clearly has a significant impact upon predicted enrollment status.

The Persistence Decision as a Function of Initial Enrollment Status

The analysis conducted thus far examines only the initial enrollment status. A logical extension of this work entails examining the persistence decision and in particular examining whether persistence is a function of initial enrollment status. This extension requires restricting the sample further to include only individuals whose second term enrollment status is known. This restriction eliminates only 12 observations, leaving 4580 for the analysis. Preliminary results (reported in Table 5) clearly indicate that the pattern of persistence differs by initial enrollment status. In each case, the majority of individuals

maintain the same enrollment status with 89.5% of those initially enrolled full-time returning as a full-time student and 54.8% of those initially enrolled part-time returning as a part-time student. However those initially enrolled part-time are five times as likely to not be enrolled the following term than those initially enrolled full-time. A test of the hypothesis that second term enrollment status is not a function of first term enrollment status is rejected at the 0.01% significance level.

Conclusion

We construct a national sample of all undergraduates who first attend an academic institution in 1989-90 using the BPS 89-94 NCES data set in order to examine both traditional and nontraditional enrollment decisions. Unlike most enrollment studies that present a snapshot in time, this study is able to follow a single cohort for approximately five years. Snapshot evidence indicates that about 33% of all degree-seeking undergraduates enroll part-time in a given year; students who stop-out are not observed in these studies at all. We find that conservatively at least 40% of our sample enroll part-time at some point during their undergraduate studies and 30% stop-out for at least one term. Even though only about 20% of undergraduates begin as part-time students, over 50% will within five years either enroll part-time or stop-out. Such nontraditional behavior is more the norm than the exception and deserves further study.

As a first step, we look at the initial enrollment decision, using a logit model to identify factors that lead individuals to attend part-time versus full-time. We find evidence that personal and household characteristics affect the decision to attend part-time (for example, Hispanics and married men are significantly more likely to attend part-time), but we also find that economic factors play an important role. In particular, modest decreases in the unemployment rate can lead to a doubling of the probability of part-time enrollment.

Most research studies dealing with college enrollment and retention have for a variety of reasons focused on full-time students and virtually ignored part-time enrollment. The results of this study indicate that part-time enrollment is remarkably common and can be modeled. Preliminary evidence suggests that retention rates differ depending upon initial enrollment status. Failing to control for

enrollment intensity could affect the results and accuracy of retention studies and severely limit their predictive power, even if a national data set is used.

Table 1

Sample Characteristics

Personal Characteristics	1989-94 BPS Sample[a]	1997 National Sample[b]
Female	53.32%	53.77%
Race:		
White	85.68	
Black	8.14	
Other Race	6.17	
Hispanic Ethnicity	7.18	
Race & Ethnicity:		
White, Non-Hispanic	79.67	71.35
Black, Non-Hispanic	8.05	12.00
Hispanic	7.18	8.33
Other	5.11	8.32
Year Graduated from High School:		
1989 or 1990	79.07	
1988	6.05	
1980-1987	8.29	
Before 1980	6.59	
Age:		
< 20 Years Old	80.46	26.67[c]
20-24 Years Old	10.15	37.37[c]
25-34 Years Old	5.57	18.81[c]
35+ Years Old	3.82	17.15[c]

Educational Attainment of Most Educated Parent:	
Less than High School	6.44
High School	30.16
Trade School	4.12
Some College	18.22
College Degree	20.58
Post-Graduate	16.65
Missing	3.83
Not Dependent upon Parents	16.86
Marital Status at Date of First Enrollment:	
Never Married	89.29
Married	7.95
Divorced, Separated, Widowed	2.76
Parent	17.26

Enrollment Data	1989-94 BPS Sample[a]	1997 National Sample[b]
Length of Enrollment		
1 Term	6.28%	
≤ 1 Year	19.43	
≤ 2 Years	32.89	
≤ 3 Years	49.49	
≤ 4 Years	74.25	
Enrollment Status as of 1994 Interview		
Received a Bachelor's	29.13	
Enrolled	21.55	
Not Enrolled / Drop-Out	49.32	
Number of Institutions Attended		
1	62.49	
2	29.12	
3-5	8.39	
Type of School at which Initially Enroll		
Public, 4+ Year	35.70	34.04
Private, 4+ Year	17.19	19.93
Public, 2-3 Year	43.56	41.63
Private, 2-3 Year	3.56	4.40
Number of Summer Terms Attended		
0	56.56	
1	25.18	
2	10.92	

3-5	7.35	
Part-Time/Full-Time Status: 1st Term	17.71[d]	21.9%
Part-Time/Full-Time Status: 5 Years		
Always FT *	47.88	
Always PT	9.52	
Some FT, Some PT	26.80	
Some FT, Some PT, Some Unknown	2.30	
Some FT, Some Unknown *	6.46	
Some PT, Some Unknown	1.01	
Always Unknown *	6.02	
Maximum Possible All FT: Sum of *	60.36	
Stop-Out	30.25	
Unweighted Number of Observations	5471	

a: BPS89-94 sample restricted to those first attending an academic institution during the 1989-90 year and weighted to reflect the national population.

b: 1997 enrollment statistics for first-time, degree seeking freshmen from the 1999 Educational Digest, except as otherwise noted.

c: Figures represent all undergraduates in degree-granting institutions. Inclusion of upperclassmen and non-degree seeking students substantially increases the fraction of older students.

d : Calculated excluding those for whom first term enrollment status is not known.

Table 2

Sample Characteristics

by First Term Enrollment Status

	Enrolled	
Characteristics	Full-Time	Part-Time
Female	53.4%	54.0%
White	85.9%	86.4%
Black	8.3%	8.8%
Other Race	5.8%	4.8%
Hispanic	5.7%	16.0%
Self-Reported Math Ability		
Above Average	31.9%	17.6%
Average	51.6%	61.1%
Below Average	16.5%	21.3%
No High School Diploma	3.4%	7.9%
Parental Education		
Less Than High School	5.5%	13.7%
High School/Trade School	36.4%	60.9%
Some College/College	34.5%	1.2%
Post Graduate	20.9%	15.6%
Missing	2.6%	8.6%
Age	19.1	24.6
Age Squared	380.9	678.0
Not Dependent upon Parents	10.1%	49.2%

Marital Status		
Never Married	95.0%	64.2%
Married	3.7%	27.5%
Divorced, Separated, Widowed	1.2%	8.3%
Female*Never Married	49.6%	30.1%
Female*Married	2.7%	18.4%
Female*Div.,Sep.,Wid.	1.1%	5.4%
Number of Children by Age[a]		
Less Than Age 7	0.03	0.20
Age 7-12	0.02	0.14
Age 13-18	0.01	0.16
Female*# < Age 7	0.03	0.13
Female*# Age 7-12	0.02	0.10
Female*# Age 13-18	0.01	0.12
Unemployment Rate by State	5.21	5.13
Unemployment Rate by State and Age	13.85	9.00
Earnings of FT/FY High School Grad[b]	15.05	16.87
Ratio of College to High School Earnings[c]	1.91	1.91
Work is Very Important	34.4%	71.9%
% of Time Working While Enrolled	64.4%	83.4%
Number of Observations – Unweighted	4251	344
Percentage of Observations – Weighted	82.1%	17.9%

a Age is approximate. Those in the youngest group were born after 1981, those listed as age 7-12 were born in 1976-81, and those listed as age 13-18 were born in 1970-75.

b Differentiated by gender, age, race, and ethnicity and reported in thousands of dollars.

c Average earnings of 25-29 year old college graduates divided by average earnings of 18-24 year old high school graduates working FT/FY and differentiated by gender, race, and ethnicity.

Except as noted, all measures are calculated using sample weights.

Table 3

Logit Model of Initial Enrollment Decision

Variables	Specification (1a)	Specification (1b)	Specification (1c)
Constant	-10.6347 **	-11.1892 **	-12.6478 **
	(5.3158)	(5.2076)	(5.0848)
Female	-0.6954 **	-0.6969 **	-0.6351 **
	(0.3050)	(0.3008)	(0.3104)
Black	0.5234	0.5162	0.6471
	(0.4918)	(0.4953)	(0.4928)
Other Race	-2.2094 *	-1.7508	-1.7880
	(1.2001)	(1.2220)	(1.2241)
Hispanic	1.6058 ***	1.6403 ***	1.5689 ***
	(0.3455)	(0.3369)	(0.3346)
Above Average Math Skills	-0.6191 ***	-0.6130 ***	-0.5813 ***
	(0.2242)	(0.2287)	(0.2222)
Below Average Math Skills	0.1343	0.0658	0.1177
	(0.2149)	(0.2175)	(0.2193)
No High School Diploma	-0.9220 **	-0.8036 **	-0.8735 *
	(0.4429)	(0.3890)	(0.4571)
Parental Education			
Less Than High School	-0.5534 *	-0.5410 *	-0.5908 *
	(0.3207)	(0.3168)	(0.3312)
High School/Trade School	0.6289 ***	0.4942 **	0.5585 ***
	(0.2051)	(0.2152)	(0.2098)

Post Graduate	-0.1057	-0.0616	-0.0636
	(0.2870)	(0.2927)	(0.2851)
Missing	0.3043	0.2495	0.2401
	(0.4610)	(0.4816)	(0.4882)
Age	0.3955 **	0.3688 **	0.4298 ***
	(0.1633)	(0.1497)	(0.1573)
Age Squared	-0.0048 **	-0.0045 **	-0.0052 **
	(0.0023)	(0.0020)	(0.0022)
Not Dependent upon Parents	0.3830	0.1307	0.2508
	(0.3180)	(0.3252)	(0.3189)
Marital Status			
Married	0.9238 *	1.0736 **	0.6682
	(0.5078)	(0.4794)	(0.4925)
Div, Sep, Wid	1.5451 *	2.3658 **	1.5232 *
	(0.8510)	(0.9360)	(0.9216)
Female*Married	-0.4447	-0.2856	-0.1856
	(0.6474)	(0.6137)	(0.6253)
Female*Div,Sep,Wid	-1.1924	-1.6477 *	-1.0417
	(0.9673)	(0.9955)	(0.9928)
Number of Children by Age			
< Age 7	-0.0969	-0.1637	0.1543
	(0.3934)	(0.3752)	(0.3937)
Age 7-12	0.0352	0.1059	0.2675
	(0.4746)	(0.4031)	(0.5533)
Age 13-18	2.0018 **	1.3010	2.0228 *
	(0.9539)	(0.8251)	(1.0359)

Female*# < Age 7	-0.0365	0.0541	-0.1105
	(0.4684)	(0.4326)	(0.4685)
Female*# Age 7-12	-0.4993	-0.5976	-0.7015
	(0.5467)	(0.5217)	(0.6358)
Female*# Age 13-18	-2.0569 **	-1.3310	-2.1042 **
	(0.9841)	(0.8560)	(1.0550)
Unemployment Rate	-0.1262 ***	-0.1240 ***	-0.1170 ***
by State and Age	(0.0259)	(0.0260)	(0.0250)
Earnings of FT/FY High School	-0.1584 **	-0.1358 *	-0.1389 *
Graduates	(0.0788)	(0.0783)	(0.0806)
Ratio of College to High School	3.6392	3.6096	3.6465
Earnings	(2.6261)	(2.6771)	(2.4673)
Work is Very Important		1.3725 ***	
		(0.1694)	
% of Time Working While			1.4088 ***
Enrolled			(0.3032)
Fraction Correctly Predicted	86.1%	87.7%	87.0%
Of Those Attending FT	95.4%	96.2%	95.8%
Of Those Attending PT	43.4%	48.9%	46.8%
Mean Sum of the			
Squared Residuals	0.1044	0.0965	0.0994

Dependent variable has a value of 1 if respondent initially enrolled part-time.

All estimates are adjusted for sample weights, clustering, and stratification.

Asymptotic standard errors are reported in parentheses below coefficient values.

* (**) [***] Indicates statistical significance at the 10% (5%) [1%] level, 2-sided test.

Table 4

Predicted Probability of Initially Enrolling Part-Time

By Specification and Characteristics

	Specification			
Characteristic (1a)	(1a)	(1b)	(1c)	
	Unadjusted	Adjusted	Adjusted	Adjusted
Base Case	0.077	0.077	0.043	0.029
	(0.017)	(0.017)	(0.011)	(0.010)
Female	0.040	0.078	0.041	0.029
	(0.012)	(0.016)	(0.009)	(0.010)
Black	0.123	0.144	0.079	0.061
	(0.051)	(0.050)	(0.029)	(0.027)
Hispanic	0.294	0.330	0.211	0.142
	(0.074)	(0.078)	(0.060)	(0.053)
Unemployment Rate = 10%		0.136	0.077	0.051
Versus 15%		(0.027)	(0.018)	(0.017)
Independent & Age 25	0.272	0.317	0.167	0.142
	(0.096)	(0.102)	(0.060)	(0.071)

Independent & Age 35	0.530	0.291	0.158	0.159
	(0.197)	(0.163)	(0.097)	(0.123)
Independent, Age 35,	0.360	0.612	0.355	0.380
Female	(0.153)	(0.109)	(0.093)	(0.128)
Independent, Married,		0.508	0.354	0.269
Age 35		(0.177)	(0.151)	(0.166)
Independent, Married,		0.718	0.548	0.498
Age 35, Female		(0.097)	(0.096)	(0.130)
Base Case + Work = Important			0.151	
			(0.031)	
Working 100% of Time Enrolled				0.109
				(0.025)

Asymptotic standard errors reported in parentheses beneath the predicted probabilities.

Unadjusted means the unemployment and earnings measures were unadjusted for differences by gender, race, ethnicity, and age.

Base Case: White, non-Hispanic male, having high school diploma, average ability, parents who completed some college, age 19, dependent, never married, and no children. Specification (1b) additionally assumes the respondent did not indicate that work was very important. Specification (1c) additionally assumes the respondent never worked while enrolled.

Table 5

A Markov Matrix of First to Second Term Enrollment Status

	2nd Term Enrollment Status:		
Initial Enrollment Status:	Not Enrolled	Enrolled Part-Time	Enrolled Full-Time
Part-Time	35.1%	54.8%	10.1%
Full-Time	6.9%	3.5%	89.5%

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Author Note

All authors are in the Department of Economics at Virginia Commonwealth University, 1015 Floyd Ave., P.O. Box 844000, Richmond, VA 23284-4000, lsstratt@vcu.edu, (804) 828-7141, FAX: (804) 828-1719. The research reported in this article was made possible (in part) by a grant from the Association for Institutional Research. The data presented, the statements made, and the views expressed are solely the responsibility of the authors.

Footnotes

[1] For example, if an individual reported attending institution A for the fall, winter, and spring quarters but also reported enrolling part-time at institution B during the winter quarter, institution A was recorded as the primary institution for the winter quarter.

[2] These individuals attended no more than three separate terms and part-time/full-time status is missing for each term.

[3] Also eliminated at this stage were three individuals for whom household composition was not identified. Other missing variables were either handled using a missing variable dummy (as is the case with parental education) or by conservatively assuming that the respondent was of the majority population (ie. non-Hispanic or of average ability).

[4] Only Black, White, and Other Races are recognized due to both concerns about sample size and concerns about information available to the respondents. These data are obtained from the 1990 Census and reflect earnings in 1989.

[5] In particular, we employ the SYV commands within STATA. Again, see Dowd (2001) for further information.